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EXAMINER	
SINGH, DALZID E	

ART UNIT	PAPER NUMBER
2613	

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Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

Office Action Summary	Application No.	Applicant(s)
	10/727,005	CHIAPPETTA, JOSEPH F.
	Examiner	Art Unit
	Dalzid Singh	2633

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 December 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2 and 4-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *15* is/are allowed.

6)☒ Claim(s) *1,2,4-12,14 and 16-22* is/are rejected.

7)☒ Claim(s) *13* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 2, 4, 5, 7, 8, 10-12, 14, 16-18, 20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pidgeon (US Patent No. 5,850,305) in view of Nazarathy et al (US Patent No. 5,424,680).

Regarding claim 1, Pidgeon discloses optical transmission system, as shown in Fig. 2, comprising:

an input (107), coupleable to receive an RF signal;

a pre-distorter (102), coupled to the input, that selectively adds distortion to the RF signal (the pre-distorter is controllable by distortion control circuit (104), therefore it has the capability to selectively adds distortion);

a laser (101) that provides a light source for optical transmission;

a modulator (103), coupled to the laser and the pre-distorter, that modulates the light from the laser with the RF signal from the pre-distorter to produce an output for the transmitter (optical outputs is the output of the transmitter);

wherein the distortion added by the pre-distorter is controlled to reduce distortions in the output of the transmitter generated by the modulator (the pre-distorter is controllable by pre-distortion control circuit (104) to reduce distortion); and

a distortion monitor, coupled to the output of the transmitter, that monitors at least one frequency of the output of the transmitter to detect distortion in the modulator output without the use of a pilot tone (it would have been obvious to consider, pre-distortion control circuit, as shown in Fig. 2, as distortion monitor, which is coupled to the transmitter through optical output lines and optical receiver, that monitor at least one frequency; the frequency correspond to the filtered frequency that has been filtered by bandpass filters (B1) or (B2); as shown in Fig. 2 Pidgeon does not show the use of pilot tone).

As discussed above, Pidgeon discloses pre-distortion control circuit (104), which is considered as distortion monitor, coupled to the pre-distorter, and the modulator that uses an output of the distortion monitor to selectively generate at least one control signal for one of the modulator and the pre-distorter to reduce the distortion in the output of the transmitter (see col. 5, lines 24-37 and col. 6, lines 37-46; Pidgeon discloses transmission of correction component or signal, which control bias point of modulator; as shown in Fig. 2, Pidgeon shows the pre-distortion control circuit is coupled to predistorter (102) and modulator (103). Pidgeon differs from the claimed invention in that Pidgeon does not specifically disclose microprocessor. Nazarathy et al teach predistorter comprising of control circuit with microprocessor. Therefore, it would have been obvious to an artisan of ordinary skill in the art at the time the invention was made to provide the predistorter of Pidgeon et al with microprocessor as taught by Nazarathy et al to performs various functions. One of ordinary skill in the art would

have been motivated to do such in order to provide fast and efficient control of various tasks.

Regarding claim 2, Pidgeon discloses that the modulator is a Mach-Zehnder modulator (see col. 4, lines 24-26).

Regarding claim 4, as discussed above, the distortion is monitored by distortion monitor (pre-distortion control circuit (104)), wherein the distortion monitor includes a first frequency monitor that monitors a first frequency for distortion products and a second frequency monitor that monitors a second, different frequency for distortion products (see col. 3, lines 6-10 and col. 6, lines 27-63; second order signal (first distortion component) can be considered as first frequency and third order signal (second distortion component) can be considered as second frequency; the second and third order signal are detected to generate error correction signal; Fig. 2 shows 2nd order and 3rd order circuitries to detect the different frequencies; first frequency monitor can be associated with second order circuitries (111, 113, 117, 115, 119 and 121); second frequency monitor can be associated with third order circuitries (112, 114, 118, 116, 120 and 122)).

Regarding claim 5, as shown in Fig. 2, Pidgeon shows the first frequency monitor includes at least one filter (115) and a mixer (117) that select the first frequency (second order) and down convert the frequency to base-band (see col. 6, lines 27-36; the intermodulation generates baseband signal).

Regarding claim 7 (as far as understood), Pidgeon disclose the first frequency monitor monitors first distortion products, wherein the frequency is representative of one

of odd or even order distortion; and the second frequency monitor monitors second distortion products at a frequency, wherein the frequency is representative of one of odd or even order distortion (see col. 3, lines 4-18, Pidgeon discloses demodulating product of first and second distortion component to generate predistortion control signal which in turn compensate odd-order or even-order distortion; since the predistortion signal reduce odd or even distortion, therefore the predistortion signal represent odd or even order distortion).

Regarding claim 8, Pidgeon discloses at least one control signal generated by the microprocessor (104) comprises first and second control signals, wherein the first control signal controls a bias voltage for the pre-distorter and the second control controls a DC bias for the modulator (see col. 5, lines 24-45, Pidgeon discloses second order correction component or second control signal to adjust bias point of the modulator and third order component or first control signal to adjust parameter of the predistorter; such parameter could include bias voltage of the predistorter).

Regarding claims 9 and 22, Pidgeon discloses optical transmission system comprising distortions generator to add distortion and differ form the claimed invention in that Pidgeon does not specifically disclose a pilot tone generator that selectively adds distortion detectable at the second frequency. Nazarathy et al teach the use of tone frequencies (see col. 6, lines 37-48). Therefore, it would have been obvious to an artisan of ordinary skill in the art to provide pilot tone to the optical system. One of ordinary skill in the art would have been motivated to do such in order to detect intermodulation distortion from the signal carrier.

Regarding claim 10, Pidgeon discloses method for controlling a non-linear device, as shown in Fig. 2, the method comprising:

receiving an output signal of the non-linear device (as shown in Fig. 2, receiver (110) receives an output signal of the non-linear device (103));

generating signals indicative of a level of distortion at detected first frequency (see col. 3, lines 6-11; corrections signal indicative level of distortion).

when the signal indicates excessive distortion is present in the output signal, generating at least one control signal for one of the non-linear device and a pre-distorter to reduce the distortion (see col. 5, lines 24-45, Pidgeon discloses control signal such as second order correction component for the non-linear device (modulator) and another control signal such as third order component for the predistorter).

Pidgeon discloses optical transmission system for detecting output signal for distortion at a first selected frequency such as second order distortion and differs from the claimed invention in that Pidgeon does not specifically disclose monitoring the output signal for distortion at a first selected frequency. However, as shown in Fig. 2, Pidgeon shows pre-distortion control circuit (104) which receives and detects distortions of the optical signal. Therefore, if it is not inherent, it would have been obvious to consider the pre-distorter control circuit for monitoring the signal quality in order to provide corrective measures. One of ordinary skill in the art would have been motivated to do such in order to detect variation in the optical signal. Furthermore, as taught by Nazarathy et al, it would have been obvious to provide microprocessor to the pre-distorter.

Regarding claim 11, as shown in Fig. 2, Pidgeon shows receiving an output signal comprises receiving an output signal from a Mach-Zehnder modulator (see col. 4, lines 24-26).

Regarding claim 12, Pidgeon disclose monitoring the output signal comprises monitoring the output signal for distortions at a frequency, wherein the frequency is representative of one of odd or even order distortion (see col. 3, lines 4-18, Pidgeon discloses demodulating product of first and second distortion component to generate predistortion control signal which in turn compensate odd-order or even-order distortion; since the predistortion signal reduce odd or even distortion, therefore the predistortion signal represent odd or even order distortion).

Regarding claim 14, Pidgeon discloses generating at least one control signal comprises selectively generating a control signal to set the DC bias of the non-linear device and a control signal to establish a bias voltage for the pre-distorter (see col. 5, lines 24-45, Pidgeon discloses second order correction component or second control signal to adjust bias point of the modulator and third order component or first control signal to adjust parameter of the predistorter; such parameter could include bias voltage of the predistorter).

Regarding claim 16, Pidgeon discloses optical transmission system, as shown in Fig. 2, comprising:

at least one optical transmitter with an input coupleable to receive input data (RF input) and providing at least one optical output;

at least one optical link coupled to each of the at least one optical output (optical lines carries optical output to the optical receiver (110));

an optical receiver (110) coupled to each of the at least one optical link;

the optical transmitter including an optical modulator (103) and a pre-distorter circuit (102), wherein the pre-distorter generates distortions to reduce distortions in the output of the optical transmitter; and

a control circuit (104) for dynamic distortion control in the optical transmitter, the control circuit comprising:

an input coupleable to receive a signal from the optical modulator of the transmitter (the input is coupled to the receiver to receive signal from the optical modulator); and

a controller, coupled to the first frequency monitor to receive the first signal and to selectively create at least one control signal for one of the modulator and the pre-distorter ((see col. 5, lines 24-45, Pidgeon discloses control signal such as second order correction component for the non-linear device (modulator) and another control signal such as third order component for the predistorter).

Pidgeon discloses optical transmission system for detecting output signal for distortion at a first selected frequency such as second order distortion and differs from the claimed invention in that Pidgeon does not specifically disclose first frequency monitor, coupled to the input, that monitors the level of distortion at a first frequency and that creates a first signal indicative of the level of the distortion without the use of pilot tone. However, as shown in Fig. 2, Pidgeon shows pre-distortion control circuit (104)

which receives and detects distortions of the optical signal. Therefore, if it is not inherent, it would have been obvious to consider the pre-distorter control circuit as frequency monitor that monitor the level of distortion at a first frequency in order to provide corrective measures. For example, in Fig. 2, Pidgeon shows 2^{nd} order and 3^{rd} order circuitries to detect the different frequencies; first frequency monitor can be associated with second order circuitries (111, 113, 117, 115, 119 and 121). One of ordinary skill in the art would have been motivated to do such in order to detect variation in the optical signal. Further, Pidgeon disclose generating signals indicative of a level of distortion at detected first frequency (see col. 3, lines 6-11; corrections signal indicative level of distortion).

Furthermore, in col. 5, lines 24-45, Pidgeon discloses control signal such as second order correction component for the non-linear device (modulator) and another control signal such as third order component for the predistorter and differs from the claimed invention in that Pidgeon does not specifically disclose a controller to perform such function. Nazarathy et al teach predistorter comprising of control circuit or controller. Therefore, it would have been obvious to an artisan of ordinary skill in the art at the time the invention was made to provide the predistorter of Pidgeon et al with controller as taught by Nazarathy et al to performs various functions. One of ordinary skill in the art would have been motivated to do such in order to provide fast and efficient control of various tasks.

Regarding claim 17, as shown in Fig. 2, Pidgeon shows first frequency circuit includes at least one filter (115) and a mixer (117) that select the first frequency and

down convert the frequency to base-band (see col. 6, lines 27-36). Fig. 2 shows 2nd order and 3rd order circuitries to detect the different frequencies; first frequency monitor can be associated with second order circuitries (111, 113, 117, 115, 119 and 121); second frequency monitor can be associated with third order circuitries (112, 114, 118, 116, 120 and 122)).

Regarding claim 18, as shown in Fig. 2, Pidgeon shows a second frequency circuit (combination of elements 118, 120 and 122 forms second frequency circuit), coupled to the input, that detect the level of distortion at a second frequency and that creates a second signal indicative of the level of the distortion.

Regarding claim 20, the first frequency circuit detects first distortion products wherein the frequency is representative of one of odd or even order distortion; and the second frequency monitor monitors second distortion products, wherein the frequency is representative of one of odd or even order distortion (see col. 3, lines 4-18, Pidgeon discloses demodulating product of first and second distortion component to generate predistortion control signal which in turn compensate odd-order or even-order distortion; since the predistortion signal reduce odd or even distortion, therefore the predistortion signal represent odd or even order distortion).

Regarding claim 21, Pidgeon discloses that the controller generates first and second control signals, wherein the first control signal controls a bias voltage for the pre-distorter and the second control controls a DC bias for the optical modulator (see col. 5, lines 24-45, Pidgeon discloses second order correction component or second control signal to adjust bias point of the modulator and third order component or first

control signal to adjust parameter of the predistorter; such parameter could include bias voltage of the predistorter).

3. Claims 6 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pidgeon (US Patent No. 5,850,305) in view of Nazarathy et al (US Patent No. 5,424,680) and further in view of Scheinberg (US Patent No. 5,625,307).

Regarding claims 6 and 19, Pidgeon disclose optical transmission as discussed above comprising of mixers and differs from the claimed invention in that Pidgeon does not disclose the use of double balanced mixers. However, the use of double balanced mixers is well known. Scheinberg is cited to show such well known concept. In col. 2, lines 8-15, Scheinberg discloses double balanced mixers. Therefore, it would have been obvious to an artisan of ordinary skill in the art at the time the invention was made to provide double balanced mixer as disclosed by Scheinberg to the optical transmission system of Pidgeon. One of ordinary skill in the art would have been motivated to do such since double balanced mixer provide excellent carrier suppression and low order distortion and well suited for monolithic integration.

Allowable Subject Matter

4. Claim 15 is allowed.

5. The following is a statement of reasons for the indication of allowable subject matter:

The present invention is directed to a nonobvious improvement over the invention described in US Patent 5,850,305 to Pidgeon. The improvement comprises a control circuit for dynamic distortion control in an optical transmitter, the control circuit comprising:

a first frequency monitor, coupled to the electrical output of the photodiode, the first frequency monitor comprising:

a filter that includes a first frequency in its frequency band, an amplifier coupled to the filter, a first mixer, coupled to the amplifier to down-convert the first frequency to base-band;

a full-wave rectifier coupled to the output of the first mixer, and a log amplifier coupled to the full-wave rectifier that outputs a first signal indicative of the level of the distortion at the first frequency without the use of a pilot tone;

a second frequency monitor, coupled to the electrical output of the photodiode, the first frequency monitor comprising:

a filter that includes a second frequency in its frequency band, an amplifier coupled to the filter, a notch filter coupled to the amplifier, a second mixer, coupled to the amplifier to down-convert the second frequency to base-band;

a full-wave rectifier coupled to the output of the second mixer, and a log amplifier coupled to the full-wave rectifier that outputs a second signal indicative of the level of the distortion at the second frequency.

6. Claim 13 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

7. Applicant's arguments with respect to claims 1, 6, 9, 10 and 16 have been considered but are moot in view of the new ground(s) of rejection.

8. In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dalzid Singh whose telephone number is (571) 272-3029. The examiner can normally be reached on Mon-Fri 9am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (571) 272-3022. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DS
March 18, 2006
Dalzid Singh